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ABSTRACT

A total of 48 fifth-grade and 30 nursery-school subjects were administered picture pairs in a discrimination learning experiment. In addition to a control group, one group of subjects (pre-choice) was instructed to pronounce both items before choosing one, and another group (post-choice) was told to say both items after choosing one. The anticipation method was used, and the results indicated that there were no differences among the three conditions within either age group. The nature of the stimulus materials and the fact that control subjects pronounced their choice were discussed as possible factors contributing to the lack of differences. (Author)

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THE EFFECTS OF PRE- AND POST-CHOICE VERBALIZATION INSTRUCTIONS ON DISCRIMINATION LEARNING IN YOUNG CHILDREN

by

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Report from the
Speech and Cognitive Processes in Concept Learning
Element of Program 1: Variables and
Processes of Learning and Instruction

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Statement of Focus

Individually Guided Education (IGE) is a new comprehensive system of elementary education. The following components of the IGE system are in varying stages of development and implementation: a new organization for instruction and related administrative arrangements; a model of instructional programing for the individual student; and curriculum components in prereading, reading, mathematics, motivation, and environmental education. The development of other curriculum components, of a system for managing instruction by computer, and of instructional strategies is needed to complete the system. Continuing programmatic research is required to provide a sound knowledge base for the components under development and for improved second generation components. Finally, systematic implementation is essential so that the products will function properly in the IGE schools.

The Center plans and carries out the research, development, and implementation components of its IGE program in this sequence: (1) identify the needs and delimit the component problem area; (2) assess the possible constraints—financial resources and availability of staff; (3) formulate general plans and specific procedures for solving the problems; (4) secure and allocate human and material resources to carry out the plans; (5) provide for effective communication among personnel and efficient management of activities and resources; and (6) evaluate the effectiveness of each activity and its contribution to the total program and correct any difficulties through feedback mechanisms and appropriate management techniques.

A self-renewing system of elementary education is projected in each participating elementary school, i.e., one which is less dependent on external sources for direction and is more responsive to the needs of the children attending each particular school. In the IGE schools, Center-developed and other curriculum products compatible with the Center's instructional programing model will lead to higher student achievement and self-direction in learning and in conduct and also to higher morale and job satisfaction among educational personnel. Each developmental product makes its unique contribution to IGE as it is implemented in the schools. The various research components add to the knowledge of Center practitioners, developers, and theorists.

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Abstract

A total of 48 fifth-grade and 30 nursery-school Ss were administered picture pairs in a discrimination learning experiment. In addition to a control group, one group of Ss (pre-choice) was instructed to pronounce both items before choosing one, and another group (post-choice) was told to say both items after choosing one. The anticipation method was used, and the results indicated that there were no differences among the three conditions within either age group. The nature of the stimulus materials and the fact that control Ss pronounced their choice were discussed as possible factors contributing to the lack of differences.

I
Introduction

In a typical discrimination learning experiment, S is presented with a pair of words or pictures, and the task involves learning the "correct" item in each pair (arbitrarily predetermined by E). In the anticipation method, S initially guesses the correct item, and then is given informative feedback. Within this paradigm a number of studies have examined the effects of overt verbalization on learning (cf. Carmean, 1971). However, differences in experimental procedures make comparisons among these studies difficult, so caution must be used in drawing conclusions. For example, Goulet (1969) recently concluded that overt verbalization of both items has facilitative effects on discrimination learning in nursery-school Ss but deleterious effects on learning in fifth-grade Ss as well as adults. However, this conclusion was based on discrimination learning studies involving nursery-school Ss (Goulet, 1969), who overtly verbalized picture pairs before making their choice (pre-choice verbalization), compared with fifth-grade and college Ss (Goulet & Hoyer, 1969) who overtly verbalized word pairs after their choice during the feedback interval (post-choice verbalization).

The present study was concerned with the effects of pre- and post-choice verbalization instructions on discrimination learning involving picture pairs in nursery-school and fifth-grade Ss. It was hypothesized that post-choice instructions would hinder learning (as compared to a control group) in both age groups, since Carmean (1969) has demonstrated the similarities among various age groups in discrimination learning. Concerning pre-choice instructions, there is some evidence (Wilder & Levin, in press) which suggests that pronouncing as a method of choice facilitates discrimination learning involving picture pairs in nursery-school Ss relative to pointing as a method of choice, but that such verbalization is unnecessary (although not deleterious) for fifth-grade Ss. This finding leads to the prediction that pre-choice verbalization might aid learning in nursery-school Ss, while fifth-grade Ss would not benefit from such verbalizing. The two age groups were run independently in order to maintain the same power available in the Goulet studies (10 Ss per condition for nursery school and 16 Ss per condition for fifth grade). In addition, different list lengths were used for the different grades. There were three levels of verbalization (pre-choice, post-choice, and control) and two lists within each age group.

II
Method

Subjects

Fifty-two fifth-grade students and 30 nursery-school students participated in two independent experiments. The treatments between the two grades varied only with respect to the number of Ss per cell (16 and 10) and list length (ten pairs and four pairs for fifth-grade and nursery-school Ss, respectively).

Materials

The lists were composed of familiar picture pairs. For the fifth-grade Ss, two lists of ten pairs each were selected from among the 24 picture pairs used by Wilder and Levin (in press). Half the Ss in each condition received each list. In addition, each list was further subdivided by designation of the "correct" item in each pair. Half the Ss receiving a given list within each condition had one item of each pair designated as "correct," and the other half of those Ss had the other item designated "correct." For analysis, the "correct" designations within each list were pooled, resulting in an analysis of the effects of the two overall lists regardless of "correct" designations. Four random orders of the ten pairs in both lists were chosen as follows. The ten pairs of each list were arbitrarily numbered 1-10, this order being the first "random" order. Three random orders of the numbers 1-10 were then selected from a table of random numbers to compose the second, third, and fourth random orders. The picture pairs in both lists were sorted into these remaining three orders and all four orders were mounted in 6" x 9" three-ring folders so as to compose four anticipation trials for each list. A second identical set was constructed for each list. For the first set of each list, the left-right position of the arbitrarily designated "correct" item of each pair was balanced among the four orders, and the number of left-right correct item positions was balanced within each order, there being five each. The second set for each list was balanced in an identical manner except that the "other" item of each pair was designated "correct." A colored paste-on star was placed directly below the correct item for the feedback exposure of each pair. Finally, the sequence of presentation of the four random orders was varied in Latin square fashion. In summary, then, there were two ten-pair lists, subdivided into two sets each by designation of the "correct" items, and four sequences of the four random orders within each set, resulting in 16 different list-set by random-order-sequence combinations. Hence, no two Ss in any given condition received exactly the same combination, and all possible combinations were presented once within each condition.

As in Goulet's (1969) study, nursery-school Ss received only one list of four pairs which were randomly chosen from among all 20 pairs presented to the fifth-grade Ss. Four orders of the four pairs were chosen in Latin square fashion. Two sets of these four orders were constructed as above. For purposes of analysis, "list" for nursery-school Ss corresponds to "set" for fifth-grade Ss, and the two sets that were constructed for the nursery-school Ss will hereafter be referred to as lists. Again, the left-right position of the "correct" item of each pair was balanced among all four orders, but left-right position for the pairs within a given order was not balanced since it was feared that balancing them might influence performance on such short lists. Finally, five random sequences of the four orders were selected. In summary, there were two lists and five sequences of orders within each list, resulting in ten different list by sequence combinations. Hence, as for the fifth-grade Ss, no two Ss in any given condition received the same combination, and combinations were balanced between conditions.

Procedure

The Ss were run individually at their school in a private room. All Ss initially were required to name all the pictures they would see during subsequent testing. This was done to insure that the Ss could, in fact, name the pictures. In addition, it was hoped that this brief pre-familiarization would induce consistency in in Ss' naming responses (e.g., it is desirable that any given S consistently respond "rabbit" to the appropriate picture as opposed to responding "rabbit" one time and "bunny" the next).

Instructions were then read to S along with the presentation of two example picture pairs. The Ss were instructed with the examples until they had both procedure and test items correct on two consecutive trials. Following the examples, testing began with the experimental lists and was continued to a criterion of two consecutive perfect trials. The assigned sequence of orders was repeated for Trials 5-8, 9-12, and 13-16 for all Ss. In order to avoid excessively long sessions with any S, an upper limit of 16 trials was used; data from Ss exceeding this limit were discarded.

Instructions varied slightly according to the appropriate verbalization condition. The control Ss were instructed in standard discrimination learning procedures. During the anticipation portions of a trial, they were required to indicate their choice of the correct picture by pointing to it and telling E what it was. Otherwise, no verbalization was required. Feedback consisted of the immediate presentation of the same pair with the correct picture being "starred" as described above. Pre-choice Ss received the same instructions as control Ss except that they were additionally required to name both pictures for E prior to indicating which picture they thought was the "correct" one during anticipation. The post-choice Ss were also instructed the same as control Ss except that they were required to name both pictures for E during the feedback portions of each trial, after indicating their choice.

III
Results

Since the number of stimuli varied for each grade level, the results were analyzed separately. The dependent variables were trials to criterion and errors on Trials 1-3 (each S completed a minimum of three trials). Univariate analyses revealed no significant list effect on either measure within either grade; consequently, all data were pooled over lists.

Fifth Grade

Of the 52 Ss participating in the experiment, four failed to reach criterion within 16 trials. Of these four, two were from the post-choice condition, and one each was from the control and pre-choice conditions. Mean trials to criterion and mean errors for the first three trials for all three conditions are shown in Table 1.

Table 1
Fifth Grade: Trials to a Criterion of Two Consecutive Errorless Trials and Total Errors on the First Three Trials (ten picture pairs)

	Pre-choice	Post-choice	Control
Mean Trials to Criterion	6.1	5.8	5.6
Mean Errors on Trials 1-3	2.87	3.0	2.73

The planned comparisons between the average of the control and pre-choice conditions vs. the post-choice, as well as the contrast between pre-choice and control, were nonsignificant (all F's < 1).

Nursery School

Table 2 shows the means for both dependent variables in all three conditions for nursery-school Ss. Using the same contrasts as with the fifth-grade data, no significant differences were observed, although the average of the control and pre-choice groups vs. the post-choice contrast approached significance (F = 1.87, df = 1/26, p < .20) on the trials to criterion measure.

Table 2
Nursery School: Trials to a Criterion of Two Consecutive Errorless Trials and Total Errors on the First Three Trials (four picture pairs)

	Pre-choice	Post-choice	Control
Mean Trials to Criterion	4.5	6.6	4.7
Mean Errors on Trials 1-3	1.23	1.47	1.07

IV
Discussion

Although post-choice verbalization of both items tended to inhibit discrimination learning in both age groups, these results were not statistically reliable. Also, for trials to criterion, the pre-choice mean was higher than post-choice in fifth-grade Ss, which was not predicted. Further, while nursery-school performance in the pre-choice group was slightly better than the control group on the trials to criterion measure, mean errors were higher in the pre-choice condition than the control group. However, since there were no significant differences, and assuming the validity of the null hypothesis, these results suggest that pre-choice and post-choice verbalization instructions have little effect on discrimination learning involving picture pairs in nursery-school and fifth-grade Ss.

One factor which could have contributed to this failure to reject the null hypothesis was the stimulus materials used in this experiment. Picture pairs were used for both age groups, and our materials were similar to Goulet's for nursery-school Ss. However, his finding that pre-choice verbalization facilitates learning in nursery-school Ss was minimal ($t = 1.18$, $df = 18$, $p < .20$), so we cannot draw firm conclusions from his or our data, and since there are no other data available on pre-choice verbalization, our conclusions must be postponed. Concerning the lack of effects associated with post-choice verbalization, the type of items used also could have had an influence. For example, most studies reporting such negative effects (e.g., Goulet & Hoyer, 1969; Kausler & Sardello, 1967; Sardello & Kausler, 1967) used word pairs, and since word pairs are more difficult to learn than picture pairs (Wilder & Levin, in press), perhaps verbalizing word pairs compounds the difficulty in discrimination. In the one study which used picture pairs with adult Ss and found post-verbalization more difficult than control instructions (Carmean & Weir, 1967), there was high intra-pair similarity (pictures of common animals were used).

Also, the fact that all three groups overtly verbalized as a method of choice could have contributed to this lack of differences among groups. For example, Wilder and Levin (in press) found that pronouncing was superior to pointing as a method of choice; consequently, control Ss probably benefited from pronouncing their choice. A better test of the effects of verbalization on learning would involve a completely silent control group.

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